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PENSOFT

Alsodes verrucosus (Philippi, 1902) (Anura, Alsodidae): a new locality for a very poorly known species

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Abstract

We report the presence of *Alsodes verrucosus* (Philippi, 1902) in Cayutué, Los Lagos Region, Chile, extending this species' geographic distribution 65 km south of the previously southernmost record. An updated distribution map is provided for *A. verrucosus* and previous records in the literature are discussed.

Keywords

Conservation, distribution, frogs, *Nothofagus* forest.

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Introduction

The genus *Alsodes* Bell, 1843 currently comprises 19 species which are distributed in Chile and Argentina (Correa et al. 2016; Frost 2019). *Alsodes verrucosus* (Philippi, 1902) is one of the least known species of this austral genus of anurans due to poor information about its ecology, behavior, and distribution range (Rabanal and Nuñez 2008; Núñez et al. 2010). In Chile this species is confirmed from only two localities: the type locality in Cautín province, Araucanía Region (38°50′S [longitude unrecorded]; see Díaz and Núñez 1988), and Puyehue National Park (40°42′S, 072°18′W; Formas and Brieva 2004), Los Lagos Region (see also Rabanal and Nuñez 2008) (Fig. 1). Its geographic range has been defined based on these two geographic records (Lobos et al. 2013). Elgueta et al. (2006) mentioned *A. verrucosus* in a baseline study at Futaleufú National Reserve, but this record was not considered nor mentioned by neither Lobos et al. (2013) nor Correa et al. (2016), due to the phylogenetic analysis by Blotto et al. (2013) who assigned this population to another species, *Alsodes gargola* Gallardo, 1970.

It was proposed that this species in Argentina inhabits the eastern slopes of the Andean range between the provinces of Neuquén and Río Negro (Vellard 1947; Cei 1987; Vaira et al. 2012). Nevertheless, this information has been doubted due to the uncertain taxonomic status of these populations (Lavilla and Cei 2001; Núñez et al. 2010; Vaira et al. 2012), and some authors have proposed that these populations are *Alsodes neuquensis* (Cei, 1976) (Blotto et al. 2013: appendix S3). As such, the IUCN Red

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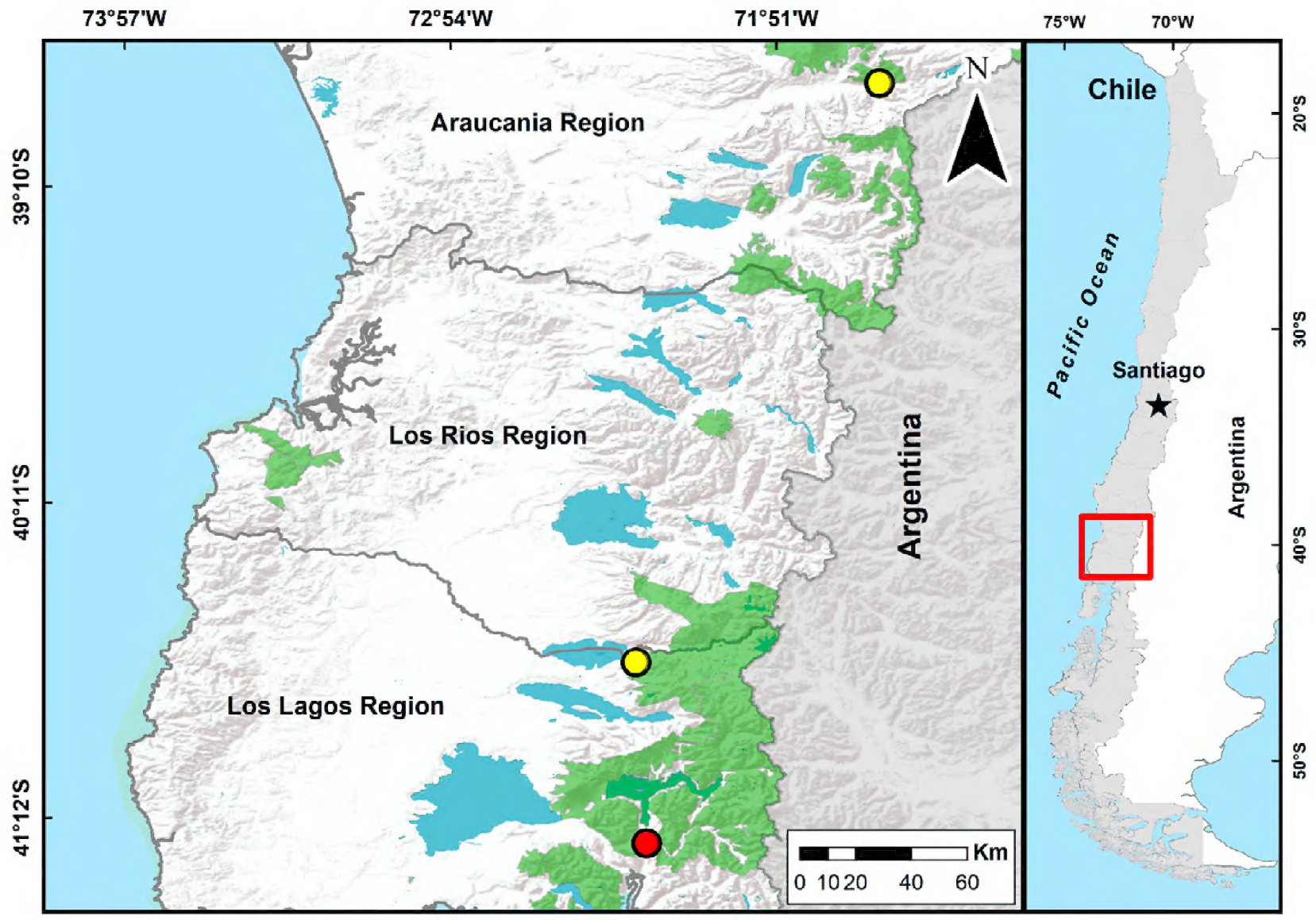

Figure 1. Distribution map of *Alsodes verrucosus*. Yellow dots: known records of *A. verrucosus*; Cautín (38°50'S; longitude is not given by the authors; see Díaz and Núñez 1988) and Puyehue National Park (40°42'S, 072°18'W; Formas and Brieva 2004). Red dot: new record at Cayutué (41°17'49"S, 072°16'10"W), Llanquihue, Los Lagos Region, Chile. Green shaded areas: Protected Wild Areas by the State of Chile. Datum: WGS84.

List of Threatened Species (IUCN SSC Amphibian Specialist Group 2019b) did not include these records in the distribution map of *A. verrucosus*.

Given the great expanse of temperate evergreen *Nothofagus* sp. forest in the area comprised between the Chilean records (Luebert and Pliscoff 2017), the scarcity of records of *A. verrucosus* in the literature is noteworthy.

Methods

Two juveniles and one subadult of *Alsodes verrucosus* were recorded during field sampling at Cayutué (Fig. 2). The landscape is dominated by native temperate evergreen forest (Fig. 3), with vegetation composed primarily of members of the families Nothofagaceae and Hymenophyllaceae (Luebert and Pliscoff 2017). Individuals of *A. verrucosus* were found under a rotten tree trunk, surrounded by leaf litter and small rocks, in a shady area. Specimens were photographed for identification but not collected.

Although *A. verrucosus* has been said to inhabit Argentina, records from that country were not included in the distribution because they have not been verified (Núñez et al. 2010; Vaira et al. 2012), and currently some

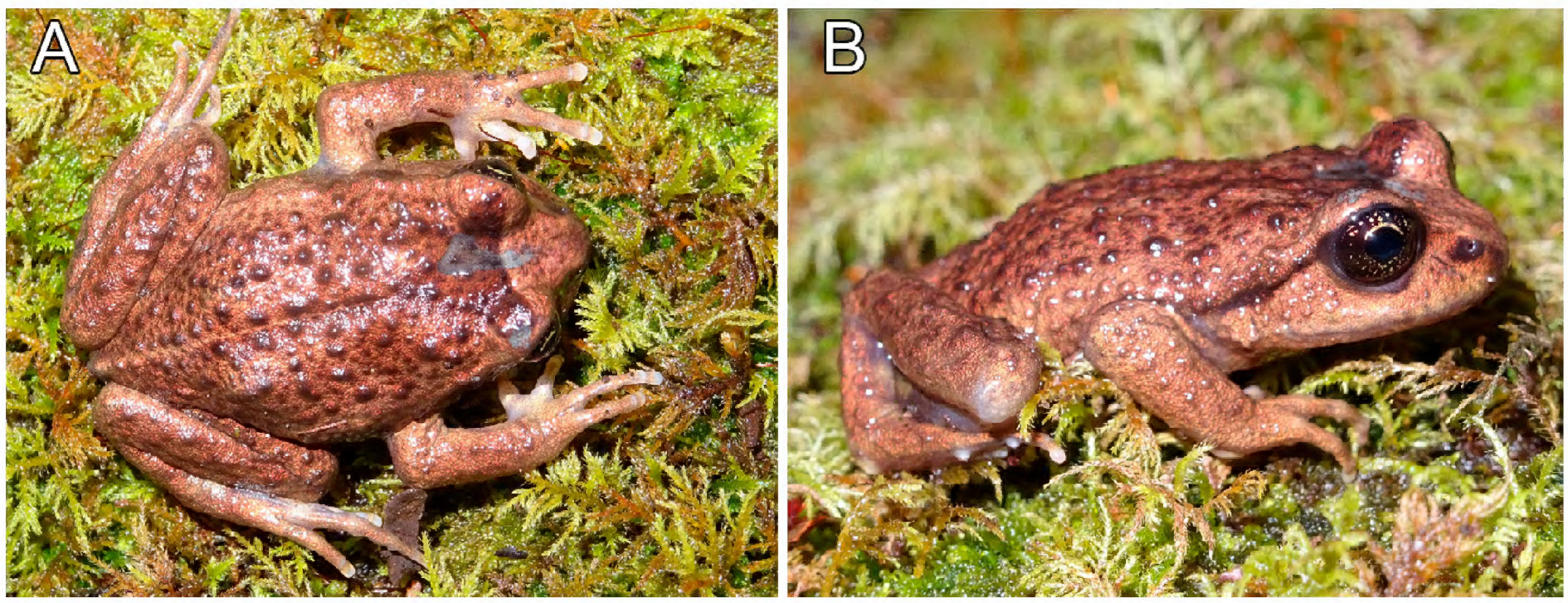

Figure 2. Subadult individual of *Alsodes verrucosus* (not collected) found in Cayutué, Llanquihue, Los Lagos Region, Chile. **A.** Dorsal view, see the finger tips rounded, toes free, dorsal region with brown spots, arms and thighs with warty granulations and wide interocular brown spot. **B.** Side view, see the narrow dark brown strip from end margin of eye to the beginning of arm and the limbs with no bracelet.

Figure 3. Habitat in which *Alsodes verrucosus* was found in Cayutué, Llanquihue, Los Lagos Region, Chile.

authors suggest that these records correspond to *Alsodes neuquensis* (Blotto et al. 2013: appendix S3). We have included the Puyehue National Park and Cautín records in our distribution map (Fig. 1). Given that the longitude of the record from Cautín is unknown (Díaz and Núñez 1988; Blotto et al. 2013), we estimated it based on: (a) the suitable habitat for this species within *Nothofagus* forest; and (b) the type locality, which was given as "Andibus Provinciae Cautín" (Andean Cautín Province; Philippi 1902; Blotto et al. 2013). For an additional reference, see the distribution map of *Alsodes verrucosus* (Olive Spinychest Frog) in IUCN SSC Amphibian Specialist Group (2019b).

Results

New record. Chile, Los Lagos Region, Llanquihue, Cayutué (41°17′49″S, 072°16′10″W, 415 m a.s.l.), recorded by Jorge Mella Romero, 4 October 2018 (3 individuals, not collected).

Identification. The specimens were identified as *Alsodes verrucosus* based on distribution information (see Formas and Brieva 2004; Rabanal and Nuñez 2008; Blotto et al. 2013; Lobos et al. 2013) and diagnostic features of this species. These features include: finger tips rounded; toes free, without interdigital webbing; dorsal skin with irregular brown spots; and skin, arms, and thighs with dense warty granulations (Philippi 1902; Cei 1958; Rabanal and Nuñez 2008). Other diagnostic characters are: wide interocular spot joins with the rest of dorsal spots; dark brown strip from the posterior margin of eye to the beginning of arm; and limbs with no bracelets (Rabanal and Nuñez 2008). Our identification was corroborated by Chilean herpetologists Felipe Rabanal and Jorge Mella.

Discussion

The new record at Cayutué extends the geographic distribution of *A. verrucosus* 65 km south of the southernmost known occurrence in Puyehue National Park (Fig. 1), and it is only the second record with precise georeferenced occurrence data. The scarcity of data accounts for the very poor knowledge of this species (Rabanal and Nuñez 2008; Vaira et al. 2012). In this frame, it is necessary to confirm the taxonomic status of the Argentine populations (Núñez et al. 2010; Vaira et al. 2012). In Chile, one of the reasons for this knowledge gap is the lack of rigorous field campaigns, chiefly due to economic reasons, to determine the geographic distribution of amphibians (Correa et al. 2016). In fact, most of amphibian records are casual and occur when another goal is being pursued (Cuevas 2011).

On the other hand, *A. verrucosus* is not as recognizable as other species of *Alsodes*, so it may have been seen in the area but not identified as such. Díaz and Núñez (1988) reported *A. verrucosus* from Wellington Island (50°00′ S, 74°45′ W), which is almost 940 km south of our record. However, Chilean herpetologists currently disregard the Wellington Island record (Rabanal and Nuñez 2008; Núñez et al. 2010; Lobos et al. 2013), given that the only *Alsodes* species that far south are *Alsodes australis* Formas, Úbeda, Cuevas & Núñez, 1997; *Alsodes coppingeri* (Günther, 1881), and *Alsodes kaweshkari* Formas, Cuevas & Núñez, 1998 (Formas et al. 2008; Rabanal and Nuñez 2008; Lobos et al. 2013).

Although Elgueta et al. (2006) mentioned the presence of *A. verrucosus* in Futaleufú National Reserve (220 km south of the locality reported by us), this record does not have geographic reference nor identification, and were not recognized in later publications (see e.g. Rabanal and Núñez 2008; Núñez et al. 2010). Blotto et al. (2013) clarified the taxonomic status of the Futaleufú population (see also Lobos et al. 2013); that population is assignable to *Alsodes gargola*.

Chile's Species Classification Regulation (Reglamento de Clasificación de Especies de Chile; Chilean Environmental Ministry 2017) and the IUCN Red List (IUCN SSC Amphibian Specialist Group 2019b) considered this species to be Endangered. We consider a Data Deficient classification as more realistic due to the few confirmed records of this species and its little-known biology (Formas and Vera 1983; Formas and Brieva 2004; Rabanal and Nuñez 2008). We highlight the importance of defining more precisely the geographic ranges of species, which are needed for determining conservation status.

Our research has led us to assign the newly found specimens to *A. verrucosus*. However, phylogenetic studies are necessary to confirm the taxonomic status of the *Alsodes* populations present throughout the area. Two populations, which have been assigned to *Alsodes monticola* Bell, 1843, were reported from Vicente Pérez Rosales National Park (Veloso et al. 1974) and La Picada (Formas and Pugín 1978). These populations are between Puyehue and our new record, but they have been ignored in the literature, and currently their taxonomic identity is unknown. Given that *A. monticola* inhabits the Aysén Region (Lobos et al. 2013; IUCN SSC Amphibian Specialist Group 2019a), it is probable that these populations are *A. verrucosus*.

With this new record, the geographic distribution of *A. verrucosus* extends 65 km south (from Puyehue to Cayutué) and includes several protected areas in which it could inhabit (Fig. 1). This is a necessary and important information that should be considered in the reassessment of its Chilean conservation status when, in a future, there exist more precise data and antecedents about its ecology.

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Authors' Contributions

JMR collected and analyzed the data, JMR and PLM wrote the text.

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